

CLAIMS

1. A lithographic projection apparatus comprising:
 - a support configured to hold a patterning device, the patterning device configured to pattern a beam of radiation according to a desired pattern;
 - a substrate table configured to hold a substrate;
 - a projection system configured to project the patterned beam onto a target portion of the substrate;
 - a liquid supply system configured to at least partly fill a space between said projection system and said substrate, with a liquid through which said beam is to be projected; and
 - an isolator, having at least a portion to allow passage of said beam therethrough, provided between said projection system and said substrate table and mechanically isolated from said projection system.
2. Apparatus according to claim 1, wherein said isolator comprises a transparent plate.
3. Apparatus according to claim 1, wherein said portion is transparent and has a refractive index at the wavelength of said beam substantially the same as the refractive index of the liquid at that wavelength.
4. Apparatus according to claim 1, wherein said isolator is so shaped and positioned that a first liquid part is maintained between the projection system and the isolator and a second liquid part is maintained between the isolator and the substrate table, and with no liquid communication between the first and second liquid parts.
5. Apparatus according to claim 1, comprising an actuator system configured to maintain said isolator substantially stationary relative to said projection system.
6. Apparatus according to claim 5, wherein said actuator system comprises a position

sensor configured to measure the position of the isolator relative to the projection system and an actuator coupled to said position sensor.

7. Apparatus according to claim 6, wherein said position sensor is mounted on a reference frame which also supports said projection system.
8. Apparatus according to claim 7, wherein said actuator is mounted on a base frame from which the reference frame is mechanically isolated.
9. Apparatus according to claim 5, wherein said actuator system is controlled in a feedback manner.
10. Apparatus according to claim 5, wherein said actuator system is controlled in a feed-forward manner.
11. Apparatus according to claim 1, wherein said support and said substrate table are movable in a scanning direction to expose said substrate.
12. Apparatus according to claim 1, wherein said isolator is connected to a base frame of the apparatus.
13. Apparatus according to claim 12, wherein said projection system is connected to a reference frame which is isolated from the base frame.
14. Apparatus according to claim 13, wherein said reference frame comprises one or more position sensors to measure a position of at least one of the substrate and the substrate table.
15. Apparatus according to claim 1, wherein said liquid supply system is configured to provide a first liquid portion through which the patterned beam can be projected, said substrate capable of imparting a vibration in said first liquid portion and to provide a

second liquid portion through which the patterned beam can be projected, said second liquid portion being in contact with said projection system and said isolator is disposed between said first and second liquid portions to inhibit a vibration in said first liquid portion from being transmitted to said second liquid portion.

16. A device manufacturing method comprising:

- providing a liquid to at least partly fill a space between a substrate and a projection system; and
- projecting a patterned beam of radiation, through an isolator mechanically isolated from said projection system between said substrate and said projection system and through said liquid, onto a target portion of the substrate.

17. Method according to claim 16, wherein said isolator comprises a transparent plate.

18. Method according to claim 16, wherein said isolator comprises at least a portion having a refractive index at the wavelength of said beam substantially the same as the refractive index of the liquid at that wavelength.

19. Method according to claim 16, wherein said isolator is so shaped and positioned that a first liquid part is maintained between the projection system and the isolator and a second liquid part is maintained between the isolator and the substrate table, and with no liquid communication between the first and second liquid parts.

20. Method according to claim 16, comprising maintaining said isolator substantially stationary relative to said projection system.

21. Method according to claim 20, wherein said maintaining comprises measuring the position of said isolator relative to the projection system and actuating said isolator using said measured position.

22. Method according to claim 21, wherein said measuring is performed using a

position sensor mounted on a reference frame which also supports said projection system.

23. Method according to claim 21, wherein said actuating is performed using an actuator mounted on a base frame from which the reference frame is mechanically isolated.

24. Method according to claim 21, comprising controlling said actuating in a feedback manner.

25. Method according to claim 21, comprising controlling said actuating in a feed-forward manner.

26. Method according to claim 16, comprising moving said support isolator and said substrate table in a scanning direction to expose said substrate.

27. Method according to claim 16, wherein said isolator is connected to a base frame of the apparatus.

28. Method according to claim 27, wherein said projection system is connected to a reference frame which is isolated from the base frame.

29. Method according to claim 28, wherein said reference frame comprises one or more position sensors to measure a position of at least one of the substrate and the substrate table.

30. Method according to claim 16, comprising providing a first liquid portion through which the patterned beam can be projected, said substrate capable of imparting a vibration in said first liquid portion and providing a second liquid portion through which the patterned beam can be projected, said second liquid portion being in contact with said projection system, wherein said isolator is disposed between said first and second liquid portions to inhibit a vibration in said first liquid portion from being transmitted to said second liquid portion.

31. A lithographic projection apparatus comprising:
- a support configured to hold a patterning device, the patterning device configured to pattern a beam of radiation according to a desired pattern;
 - a movable substrate table configured to hold a substrate;
 - a projection system configured to project the patterned beam onto a target portion of the substrate;
 - a liquid supply system configured to provide a first liquid portion through which the patterned beam can be projected, said substrate table capable of imparting a vibration in said first liquid portion and to provide a second liquid portion through which the patterned beam can be projected, said second liquid portion being in contact with said projection system; and
 - a vibration isolator disposed between said first and second liquid portions to inhibit a vibration in said first liquid portion from being transmitted to said second liquid portion.
32. Apparatus according to claim 31, wherein said isolator comprises a transparent plate.
33. Apparatus according to claim 31, wherein said isolator comprises a portion that is transparent and has a refractive index at the wavelength of said beam substantially the same as the refractive index of the liquid at that wavelength.
34. Apparatus according to claim 31, comprising an actuator system configured to maintain said isolator substantially stationary relative to said projection system.
35. Apparatus according to claim 34, wherein said actuator system comprises a position sensor configured to measure the position of the isolator relative to the projection system and an actuator coupled to said position sensor.
36. Apparatus according to claim 35, wherein said position sensor is mounted on a

reference frame which also supports said projection system.

37. Apparatus according to claim 36, wherein said actuator is mounted on a base frame from which the reference frame is mechanically isolated.

38. Apparatus according to claim 31, wherein said support and said substrate table are movable in a scanning direction to expose said substrate.

39. Apparatus according to claim 31, wherein said isolator is connected to a base frame of the apparatus.

40. Apparatus according to claim 39, wherein said projection system is connected to a reference frame which is isolated from the base frame.

41. Apparatus according to claim 40, wherein said reference frame comprises one or more position sensors to measure a position of at least one of the substrate and the substrate table.